

Attorney's Docket No. 1033018-000138

Application No. 10/790,753

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AUG 24 2006

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

1. (Currently Amended) A device useful for transferring quantities of a fluid from a reservoir to a downstream component, comprising:

a cylinder housing having an axially extending cylindrical recess therein;

a piston rotatably and reciprocally mounted within the cylindrical recess, the outer periphery of said first piston forming an interference fit with the inner periphery of said cylindrical recess; ~~[[,]]~~

at least one groove in the outer periphery of said first piston, said groove extending parallel to the axial direction of said piston; ~~and~~

said having an inlet port adapted to provide fluid communication between an inlet and said at least one groove when said piston is in a first position, and an exit port spaced from said inlet port providing fluid communication between said at least one groove and an outlet when said piston is rotated to a second position, and said piston moves to drive fluid out of said outlet; and

a piston drive mechanism arranged to rotate the piston without translation thereof, and to translate the piston without rotation thereof.

2. (Previously Presented) The device according to claim 1, wherein said cylinder housing comprises an injection molded body of a polymeric material.

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3. (Original) The device according to claim 1, wherein said at least one groove is a rectangular groove approximately 0.005 inch deep and approximately 0.010 inch wide.

4. (Previously Presented) The device according to claim 1, wherein said at least one groove comprises a plurality of grooves, and wherein:

a first one of said grooves is formed in the outer periphery of said piston at a first circumferential position, and

a second one of said grooves is formed in the outer periphery of said piston at a second circumferential position different from said first position.

5. (Previously Presented) The device according to claim 4, wherein:  
said first and second grooves are offset relative to each other in the axial direction of said piston.

6. (Previously Presented) The device according to claim 1, wherein said piston is stepped, with a larger diameter portion of said piston fitting within a larger diameter portion of said cylindrical recess, and a smaller diameter portion of said piston fitting within a smaller diameter portion of said cylindrical recess.

7. (Previously Presented) The device according to claim 6, wherein said at least one groove is formed in the outer periphery of said smaller diameter portion of said piston.

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8. (Previously Presented) The device according to claim 6, wherein said at least one groove includes an air purge groove, and said larger diameter portion of said piston and said larger diameter portion of said cylindrical recess together define a volume in fluid communication with said air purge groove when said air purge groove is in fluid communication with said exit port.

9. (Previously Presented) The device according to claim 1, wherein the piston constitutes a first piston, and the cylindrical recess constitutes a first cylindrical recess, the device further comprising:

a second piston coaxial with said first piston and having a larger outer diameter than said first piston, said second piston forming a sleeve over the outer periphery of said first piston and being reciprocally mounted within a second cylindrical recess in the cylinder housing, said second cylindrical recess having a larger inner diameter than said first cylindrical recess.

10. (Previously Presented) The device according to claim 9, wherein one end of said second cylindrical recess forms a shoulder adjacent one end of said first cylindrical recess, with a volume being defined between said shoulder and said second piston when the second piston is spaced from the shoulder, and said volume being in fluid communication with an air purge groove when said air purge groove is in fluid communication with said exit port.

11. (Previously Presented) The device according to claim 10, wherein said at least one groove comprises first and second grooves, the first groove being in the outer periphery of said first piston at a first circumferential position, and the second groove being in the outer periphery of said first piston at a second circumferential position different from said first position.

12. (Previously Presented) The device according to claim 11, wherein downstream ends of said first and second grooves are offset relative to each other in the axial direction of said first piston.

13. (Previously Presented) The device according to claim 1 in combination with a reservoir communicating with the inlet port and containing a liquid having medicament therein, and an aerosol generator comprising a heated capillary flow passage located downstream of the exit port.

14. (Previously Presented) A piston pump for pumping fluid from a reservoir to a downstream component, said piston pump comprising:

a piston mounted rotatably and reciprocally within a cylindrical recess, said piston having a larger diameter portion fitted in a larger diameter portion of said cylindrical recess, and a smaller diameter portion fitted with an interference fit within a smaller diameter portion of said cylindrical recess,

said piston having a first fluid groove formed in an axial direction of said piston along the outer periphery of said smaller diameter portion of said piston at a first

circumferential position, said first fluid groove extending from an end of said piston part way along the outer periphery of said piston, and

said piston further including a second fluid groove formed in an axial direction of said piston along the outer periphery of said smaller diameter portion of said piston at a second circumferential position different than said first circumferential position and at least partially offset in the axial direction of said piston from said first fluid groove, the second fluid groove comprising an air purge groove.

15. (Previously Presented) The piston pump according to claim 14, wherein

an inlet port adapted to be in fluid communication with a reservoir is formed into said smaller diameter portion of said cylindrical recess at a first circumferential position, and an exit port in fluid communication with a downstream component is formed into said smaller diameter portion of said cylindrical recess at a second circumferential position,

said first fluid groove providing fluid communication between said inlet port and said smaller diameter portion of said cylindrical recess during a suction stroke of said piston, and between said exit port and said smaller diameter portion of said cylindrical recess during a dispensing stroke of said piston, and

said second purge groove providing fluid communication between an exit port and a compressed gas chamber formed between said larger diameter portion of said piston and said larger diameter portion of said cylindrical recess, when said piston is flush against one end of said smaller diameter portion of said cylindrical recess and said first fluid groove is aligned with said inlet port.

16. (Original) The piston pump according to claim 14, wherein said larger diameter portion of said piston is integral with said smaller diameter portion of said piston.

17. (Previously Presented) The piston pump according to claim 14, wherein said larger diameter portion of said piston comprises a sleeve that is fitted over the outer periphery of said smaller diameter portion.

18. (Original) The piston pump according to claim 14, wherein said piston includes an extension having at least one lug, and a barrel cam is provided for rotation about an axis perpendicular to the central axis of said piston, said barrel cam including at least one cam groove around its outer periphery with said at least one lug being engaged with said at least one cam groove, and said barrel cam further including an eccentric portion wherein the eccentricity of said eccentric portion is substantially equal to the desired stroke of said piston.

19. (Original) The piston pump according to claim 18, wherein:  
a cam plate is provided in contact with said piston extension on a surface of said piston extension opposite from said at least one lug, said cam plate being rotated by the rotation of said barrel cam such that a thicker portion of said cam plate contacts said piston extension when said at least one lug is engaged with said at least one cam groove at a region of the outer periphery of said barrel cam other than at said eccentric portion, whereby said piston is driven in a first axial direction by said

eccentric portion of said barrel cam and in the opposite axial direction by said cam plate.

20. (Original) The piston pump according to claim 19, wherein a first miter gear is fixed to said barrel cam for rotation with said barrel cam around the central axis of said barrel cam, and a second miter gear fixed to said cam plate is engaged with said first miter gear for rotation about an axis perpendicular to the central axis of said barrel cam.

21. (Original) The piston pump according to claim 14, wherein said larger diameter portion comprises an annular groove positioned radially inward from the outer diameter of the larger diameter portion and defining a flexible annular flap or lip seal around the outer periphery of the larger diameter portion.

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Previously Presented) A piston pump useful for transferring quantities of a fluid from a reservoir to a downstream component, comprising:

a cylinder housing having an axially extending cylindrical recess therein;

a piston rotatably and reciprocally mounted within the cylindrical recess, the outer periphery of said piston forming an interference fit with the inner periphery of said cylindrical recess,

at least one groove in the outer periphery of said piston, said groove extending in an axial direction of said piston, and

said cylindrical recess having an inlet port adapted to provide fluid communication between an inlet and said at least one groove when said piston is in a first position, and an exit port spaced from said inlet portion providing fluid communication between said at least one groove and an outlet when said piston is rotated to a second position, and said piston moves to drive fluid out of said outlet,

wherein said piston is stepped, with a larger diameter portion of said piston fitting within a larger diameter portion of said cylindrical recess, and a smaller diameter of said piston fitting within a smaller diameter portion of said cylindrical recess,

wherein said at least one groove includes an air purge groove, and said larger diameter portion of said piston and said larger diameter portion of said cylindrical recess together define a volume in fluid communication with said air purge groove when said air purge groove is in fluid communication with said exit port.

27. (Previously Presented) Apparatus useful for transferring quantities of a fluid having medicament therein from a reservoir to a downstream aerosol generator comprising:

a cylinder housing having an axially extending cylindrical recess therein;



a piston rotatably and reciprocally mounted within the cylindrical recess, the outer periphery of said piston forming an interference fit with the inner periphery of said cylindrical recess.

at least one groove in the outer periphery of said piston, said groove extending in an axial direction of said piston,

said cylindrical recess having an inlet port adapted to provide fluid communication between an inlet and said at least one groove when said piston is in a first position, and an exit port spaced from said inlet portion providing fluid communication between said at least one groove and an outlet when said piston is rotated to a second position, and said piston moves to drive fluid out of said outlet,

a reservoir communicating with the inlet port and containing a liquid having medicament therein, and

an aerosol generator comprising a heated capillary flow passage communicating with the exit port downstream thereof.

28. (New) The piston pump according to claim 1 wherein the piston drive mechanism comprises a cam member movable relative to the piston and operably connected to the piston by a cam groove-and-lug arrangement, the cam groove configured to produce, in response to movement of the cam member relative to the piston, the rotation of the piston without translation, and the translation of piston without rotation as the lug travels along the cam groove.

29. (New) The piston pump according to claim 28 wherein the cam groove is formed in the cam member.

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30. (New) The piston pump according to claim 29 wherein the cam member comprises a barrel cam rotatable relative to the piston for producing travel of the lug within the groove.